GEM Gas Distribution Prototype Progress

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• Prototype GEM gas distribution system installation
• Distribution panels and chassis
• Single channel flow diagram
• Data flow diagram
• Flow data
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Prototype GEM Gas Distribution System

- Regulator panel
- Flow meter panel
- Raspberry Pi station
- Nitrogen bottle
Rack Front: Regulator and Flow Meter Valve Panels

Pressure gauges

High

Low

Regulator panel

Flow meter panel

Standard flow
(max 500 sccm)

High flow
(max 1000 sccm)
Rack Back: Gas Flow Sensor Chassis with Panel Parts

- Pressure sensors
- Relief valve
- Regulator
- Main input
- Manifolds
- Gas flow sensor chassis (output)
Rack Gas Line Connections

- Pressure sensors
- Main input
- Input to pressure sensors
- Flow meter outputs
- Flow meter inputs
Rack Gas Line Connection: GFS Chassis Inputs

Main input

Gas flow sensor chassis (input side)
Rack Back: Gas Flow Sensor Chassis

• Output to detector shown
• Input on rear panel
Schematic shows a single channel of gas supply/exhaust to a GEM detector
Data Flow Diagram

Accelerator server
ops100
Hosts WEDM page

Hall B Network

Raspberry Pi
Runs GEM gas flow readout software and updates process variables

Hall B IOC server
Manages process variables

DSG GEM Gas Flow Sensor chassis

I²C Multiplexer
Cycle flow sensor readout

Gas flow sensor boards
Measures gas flow

GEM gas distribution system

UVA GEM in TEDF

Line legend
Network
I²C data
Gas flow
Chassis boundary

Jlab based or remote PC
Access Raspberry Pi software/monitor WEDM page
Remote Flow Monitoring

- DSG monitored flow transition from 235 sccm down to 80 sccm; channel 3 was set to 67 sccm
Issues

• During initial testing, the gas bottle depleted faster than expected
  – Determined that the leak was at the regulator panel
  – After troubleshooting the regulator, DSG determined that all three regulators leaked at the internal relief circuit
  – **DSG replaced with a regulator without an internal relief circuit and tested**
  – Fittings are listed as compatible with nylon and polyethylene tubing, however, during initial test, it was noted that polyethylene had better retention and did not leak
  – **DSG changed all gas lines to polyethylene**
Software Development

• DSG developed WEDM web-based monitoring

• DSG is developing regulator input and output pressure signals to add to remote monitoring capabilities
Conclusion

• Both issues of defective regulators and manufacturer misrepresentation of compatibility of gas line materials have been resolved by DSG and the prototype distribution system is performing as expected.

• A WEDM webpage was developed and is being used to monitor the system by multiple users.

• Advancements in remote monitoring of the regulator pressures and development of the exhaust readout system is moving forward.
Thank You